

REMARKS

Applicants concurrently file herewith an Excess Claim Fee Payment Letter for two (2) total excess claims and two (2) excess independent claims, a Petition for Extension of Time for a one-month extension of time, and corresponding fees.

Claims 1-20 and 22-26 are all of the claims presently pending in the Application. Claims 1 and 15 have been amended to more particularly define the claimed invention and claims 8 and 9 have been amended into independent form. Claims 24-26 have been added to claim additional features of the invention.

Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicants gratefully acknowledge the Examiner's indication that claim 23 is allowed and that claims 8-12 would be allowable if rewritten in independent form. Accordingly, Applicants have amended allowable claims 8 and 9 into independent form. Applicants, however, respectfully submit that all of claims 1-20 and 22-26 are allowable over the cited references.

Claims 1-3, 13, 14, and 18-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhang et al. (US 6,354,630; hereinafter "Zhang") in view of Ur (U.S. Patent No. 5,568,550). Claims 4 and 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhang in view of Ur, in further view of Gasper et al. (US 5,919,730; hereinafter "Gasper"). Claims 6 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhang in view of Ur, in further view of Yano et al. (US 6,035,308; hereinafter "Yano"). Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boswell (US 5,559,933) in view on Zhang, and further in view of Ur.

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The present invention relates to an invisible information recording method for recording an image being different from a visually perceived image on a part of a sheet of a paper on which an image is recorded, and an image forming apparatus using the same. Further, the invention relates to a printing system which easily retrieves the already printed document data from a part of a printed document formed by the image forming apparatus.

In accordance with certain aspects of the claimed invention, a plurality of locations of blank areas extracted from the page image of the sheet of paper include at least one blank area which is located in a position on the page image of the sheet of paper other than a location of a margin of the sheet of paper. Furthermore, no part of the digital image is recorded in the location of the image of the page image of the sheet of paper.

In related art methods and systems for embedding information, a diameter of each dot is typically 0.1 mm. However, a dot of this size is visible, which is not desirable. On the other hand, in the related art methods and systems, when invisible, isolated micro dots are embedded into the image, the recording reliability is deteriorated.

Thus, the related art methods and systems have problems in that, as the result of embedding the additional information, the image quality is deteriorated, it is difficult to read out the embedded information, and/or, when micro dots that cannot be perceived are printed, the reliability is unsatisfactory (e.g., see specification at page 3, lines 13-25, and page 4, line 1; see also page 4, lines 15-21).

The claimed invention, on the other hand, provides an image forming method and apparatus which is capable of embedding a large amount of additional information in an image in an invisible fashion and without deteriorating the image quality (e.g., see specification at page 5, lines 21-24).

According to the novel and unobvious exemplary aspects of the present invention, large amount of information different from an image visually perceived can be embedded so as to be invisible to the naked eye by utilizing blank areas on a recording sheet of paper. In other words, a lot of additional information can be embedded into a visible image by assigning information items, e.g., characters and symbols, to a plurality of patterns each consisting of dots invisible to the naked eye, which are distributed to such an extent that a variation of densities of the distributed dots cannot be visually perceived by the naked eye (e.g., see specification at page 6, lines 8-17).

For example, in the exemplary aspect of the invention illustrated in Figure 5, a blank area extraction part 32 extracts a blank area or blank areas from the print page image. Ideally, it extracts a plurality of rectangular blanks from the page image. The information 33 is prepared, which is different from the image to be printed, i.e., the image visually perceived. The information may contain detailed attributes of the printed page, file storing locations, author of the document, page correction history, and others. The information 33 different from the perceived image is converted into an invisible pattern as exemplarily shown in Figure 2, by the invisible pattern conversion part 34. The converted invisible pattern is combined with the blank areas extracted by the blank area extraction part 32, and the resultant data is output to the printer 36 (e.g., see specification at page 15, lines 3-15).

II. THE CITED REFERENCES

A. Zhang

Zhang relates to a method for encoding, on an imprintable medium, identification information for identifying the imprintable medium in a manner detectable by a print-monitoring system includes the steps of defining an identification pattern. The identification pattern is imprinted on a print control region so as to be relatively inconspicuous to an

unaided human reviewer of the printed matter while remaining detectable to a print monitoring system. The method includes the step of imprinting, at a plurality of locations in the print control region, a plurality of bit characters detectable by the print control system. The spatial distribution of the bit characters encodes information about the identity of the document.

B. Gasper, et al.

Gasper relates to media for restricting copying of a document utilizing one or more microdots that are embedded in the document for providing a non-visual, but machine detectable mark or marks. The detected means for detecting the presence of one or more microdots in the document inhibits a copy machine from copying the document (e.g., see Gasper at Abstract).

C. Bouldin

Bouldin relates to a data card for optical information featuring a gelatin layer having a thin black crust at the top of the layer. The crust is formed by developed black irregular oblong silver particles within the top 0.5 micron of the gelatin colloid matrix. The remainder of the colloid matrix is substantially clear gelatin and a reflective metallic layer is disposed below the gelatin. The strip is laminated into a wallet-size card and may be pre-patterned during formation of the crust with control indicia or pre-recorded data. User data may be recorded by modifying the black silver particles in the crust with a laser to expose the reflective underlayer. A laser or other light source is used to read data on the medium with optical contrast between the black surface metallic layer underlying the gelatin layer which can be observed in the recorded spots.

D. Dickerson

Dickerson relates to a radiation-sensitive silver halide film for reproducing digitally stored medical diagnostic images through a series of laterally offset exposures by a controlled radiation source followed by processing in 90 seconds or less, including development, fixing and drying. The film exhibits an average contrast in the range of from 1.5 to 2.0, measured over a density above fog of from 0.25 to 2.0. An emulsion layer is provided in which silver bromochloride grains (a) comprised of at least 10 mole percent bromide, based on silver, (b) having a mean equivalent circular diameter of less than $0.40\ \mu\text{m}$, (c) exhibiting an average aspect ratio of less than 1.3, and (d) coated at a silver coverage of less than $40\ \text{mg}/\text{dm}^2$. Adsorbed to the surfaces of the silver bromochloride grains at least one spectral sensitizing dye having an absorption half peak bandwidth in the spectral region of exposure by the controlled exposure source. The film contains an infrared opacifying dye that is capable of reducing specular transmission through the film before, during and after processing to less than 50 percent, measured at a wavelength within the spectral region of from 850 to 1100 nm. The film contains a magnetic recording layer which provides a positive b^* value influence that is more than offset by the negative b^* value influence of the silver bromochloride emulsion, allowing magnetic recording layer integration into the film while achieving favorable image tone and minimum density characteristics.

E. Yano, et al.

Yano relates to a document data administrating system including a filing means for previously storing data related to particular words, texts, symbols, or graphics as related data files. The system includes medium paper including at least one piece of description data, linking data, and selection data. The system further includes a reading means for reading out selection data and linking data from the medium data, a searching means for searching

corresponding related data files from the filing means according to the selection data and linking data each read out by the reading means, and an outputting means for outputting the related data files each searched by the searching means (e.g., see Yano at Abstract).

Yano discloses recording data in code areas (linking data, related data, and other data) with invisible ink or toner each readable in invisible rays such as ultraviolet rays and infrared rays. Yano asserts that visibility (readability) of data as a document for Inper (e.g., Interact paper, medium paper, etc.), can further be improved. Also, Yano asserts that the Inper can be handled on its appearance in the same manner as an ordinary document can be, and disposable Inpers can also be used for memos or the like, which allegedly makes it possible to effectively utilize paper resources (e.g., see Yano at column 33, lines 53-67).

F. Cass, et al.

Cass relates to message values included in a set of valid message values that constitute a coding scheme and which each encoded in an image region, called an encoded signal block, composed of a spatially arranged pattern of colored sub-regions (e.g., see Cass at Abstract; see also column 6, lines 42-46).

Cass discloses that the colored sub-regions have color values produced by modulating a reference color value by a color change quantity expressed as a color space direction in a multi-dimensional color space such that the average color of all of the sub-region colors is the reference color. There is a unique pattern of color-modulated sub-regions for each valid message value in the coding scheme.

In one embodiment, the color space direction is computed to be simultaneously detectable by a digital image capture device such as a scanner and substantially imperceptible to a human viewer, so that the embedded data represented by the pattern of color modulations are visually imperceptible in the encoded signal block.

When the reference color is determined to be the average color of an image region in an original color image, the encoded signal block may replace the image region in the original image, producing an encoded image version of the original image having little or no image degradation. The original image colors become carriers of the encoded data. Signal blocks may be arranged to encode data in only one dimension in an image, which allows for less complex decoding algorithms, or in a two dimensional array or grid-like structure, which allows for a high encoded data density rate.

Cass discloses that its image encoding technique is motivated by the need to reliably encode information at a high density rate in an image, and in particular in graphic or photographic images, without any perceived image degradation or distortion (e.g., see column 6, lines 42-46).

G. Hayashi, et al.

Hayashi relates to a technique for embedding digital-watermark information in image data while minimizing deterioration of the original image quality. Hayashi discloses a data processing apparatus having input means for inputting image data consisting of a plurality of coefficients, and embedding means for embedding digital-watermark information in coefficients having values falling within a predetermined range of the input image data (e.g., see Hayashi at Abstract).

H. Boswell

Boswell relates to a system and method for transferring and printing files originating on mainframe computer systems, workstations, or personal computers connected within a heterogeneous computer network is disclosed. The printer controller coordinates the distribution of print files across multiple computer systems to attached printers for printing.

In response to incoming files received from another computer system within the network, Boswell's system utilizes file mask attributes to automatically generate transfer requests and print requests. In response to user inputs through a graphical user interface, Boswell's system updates various file databases, print attribute and transfer attribute libraries, and system configurations before generating a transfer or print request. Support for multiple page description languages and multiple printers is provided (e.g., see Boswell as Abstract).

III. THE PRIOR ART REJECTIONS

A. Claims 1-3, 13, 14, and 18-22:

Claims 1-3, 13, 14, and 18-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhang et al. (US 6,354,630) in view of Ur (U.S. Patent No. 5,568,550). Applicants respectfully submit, however, that there are features of the claimed invention that are neither taught nor suggested by the alleged combination of Zhang and Ur.

That is, the alleged combination of Zhang and Ur does not teach or suggest "*plurality of locations of blank areas extracted from said page image of said sheet of paper include at least one blank area which is located in a position on said page image of said sheet of paper other than a location of a margin of said sheet of paper*" (emphasis added by Applicants), as recited in exemplary claim 1, and similarly recited in exemplary claim 15.

Applicants submit that support for this feature can be found in Figure 3 of the present application, which shows at least part of the vertically arranged invisible information located inside the margin (i.e., other than in the margin shown by the dashed lines) of the page.

Turning to the present Office Action, Zhang and Ur disclose printing in the margins, which the Examiner alleges are inherently blank locations on the page (e.g., see Office Action at page 4).

Therefore, Applicants submit that the alleged combination of Zhang and Ur does not disclose or suggest extracting blank areas from other than in the margin.

Instead, Applicants submit that Zhang discloses printing the print control symbol 214 in the upper left hand corner of the page 212, as shown in Figure 1 (see also Zhang at column 5, lines 55-67, and column 6, lines 1-9), which Applicants submit suggests printing the print control symbol 214 in the margins.

Further, Zhang discloses a “clear space buffer” around the print control symbol 214, which we would argue also suggests printing the print control symbol 214 in the margins (e.g., see Zhang at column 6, lines 1-9).

Moreover, Zhang also discloses that the print control symbol can be located in substantially the same location even between different printing runs of different printed matter (e.g., see Zhang at column 3, lines 39-44).

Thus, Applicants submit that this also suggests printing the print control symbol 214 in the margins. Otherwise, the location would not necessarily be substantially the same for different printed matter.

Also, in the Response to Arguments section of the present Office Action, the Examiner acknowledges that Ur discloses a “shotgun” approach in which a plurality of patterns are produced on the page in hopes of being located in a blank location. Ur acknowledges this method provides no guarantee that any area on the document will always be free of selected matter, col. 4, lines 1-2, and thus there is no guarantee that the pattern will be produced in a blank location.

However, Applicants submit that the alleged combination of Zhang and Ur does not teach or suggest that “*no part of said digital image is recorded in said location of said image of said page image of the sheet of paper*” (emphasis added by Applicants), as recited in exemplary claim 1, and similarly recited in exemplary claim 15.

Thus, the alleged combination of Zhang and Ur clearly does not teach or suggest all of the features of claims 1-3, 13, 14, and 18-22, and therefore, the Examiner is requested to reconsider and withdraw this rejection.

B. Claims 4 and 5:

Claims 4 and 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhang in view of Ur and further in view of Gasper et al. (US 5,919,730).

For the reasons set forth above, Applicants submit that claims 4 and 5 are patentable over Zhang, Ur and Gasper, either individually or in combination, at least by virtue of their dependency from claim 1.

Therefore, the Examiner is respectfully requested to reconsider and withdraw this rejection.

C. Claims 6 and 7:

Claims 6 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhang in view of Ur and further in view of Yano et al. (US 6,035,308).

Applicants submit that claims 6 and 7 are patentable over the cited combination of references at least by virtue of their dependency from claim 1, as set forth above.

D. Claims 15-17

Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boswell (US 5,559,933) in view of Zhang, and further in view of Ur.

Applicants submit that claims 15-17 is patentable over Boswell, Zhang and Ur, either individually or in combination, for somewhat similar reasons as independent claim 1, as set forth above.

Therefore, the Examiner is respectfully requested to reconsider and withdraw this rejection.

IV. NEW CLAIMS

New claims 24-26 have been added to provide more varied protection for the claimed invention and to claim additional features of the invention. These claims are independently patentable because of the novel and non-obvious features recited therein.

Applicants submit that new claims 24-26 are patentable over any combination of the cited references at least based on analogous reasons to those set forth above with respect to claims 1-20, 22 and 23.

V. CONCLUSION

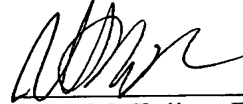
In view of the foregoing, Applicants submit that claims 1-20 and 22-26, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

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